Appendix A: Threatened and Endangered Species in Puget Sound

State and federal listed species in Puget Sound

(As of October 2006)

This list includes marine-dependent species that live all or part of their life cycle in the waters of the Strait of Juan de Fuca, San Juan Islands, Hood Canal, and central and south Puget Sound. Not included are species that live in fresh water and upland of the shoreline.

Group	Common Name	State Status	Federal Status
Marine Mammals	Northern Pacific Humpback Whale	E	E
	Steller Sea Lion	T	T
	Orca	E	E
	Pacific Harbor Porpoise	C	
	Northern Sea Otter	E	Co
Birds	Bald Eagle	T	
	Canada Goose, Aleutian	M	Co
	Golden Eagle	C	
	Marbled Murrelet	T	T
	Tufted Puffin	C	Co
	Brandt's Cormorant	C	
	Cassin's Auklet	C	Co
	Common Murre	C	
	Western Grebe	C	
	American White pelican	E	
	Brown pelican	E	E
	Snowy Plover	E	T
Marine and Anadromous Fishes	Chinook Salmon (Puget Sound)	C	T
	Chum Salmon (Hood Canal/E. Strait of Juan de Fuca)	C	T
	Coho Salmon (Puget Sound/Strait of Georgia)		C
	Bull Trout (Coastal/Puget Sound)	C	T
	Pacific Hake	C	C
	Pacific Cod	C	
	Walleye Pollock (South Puget Sound)	C	Co
	Pacific Herring (Cherry Point/Discovery Bay)	C	C
	Brown Rockfish	C	
	Copper Rockfish	C	
	Greenstriped Rockfish	C	
	Widow Rockfish	C	
	Yelloweye Rockfish	C	
	Quillback Rockfish	C	
	Black Rockfish	C	
	China Rockfish	C	
	Tiger Rockfish	C	
	Bocaccio Rockfish	C	
	Canary Rockfish	C	
	Redstripe Rockfish	C	
	Yellowtail Rockfish	C	
	Eulachon	C	
	River Lamprey	C	Co
	Pacific Lamprey		Co
	Coastal Cutthroat		Co
Invertebrates	Olympia Oyster	C	
	Newcomb's Littorine Snail	C	Co
	Pinto (Northern) Abalone	C	

E – Endangered
T – Threatened
C – Candidate
Co – Concern
M - Monitor

Appendix B: Common and Scientific Names of Species Reported in the *2007 Puget Sound Update*

Scientific names are used at the first mention of a species, then referred to by common name throughout the remainder of the report.

Common Name	Scientific Name
Amnesic shellfish poison dinoflagellate	*Pseudonitzschia*
Arctic brant	*Branta bernicla*
Asian colonial tunicate	*Didemnum spp.*
Atlantic salmon	*Salmo salar*
Bald eagle	*Haliaeetus leucocephalus*
Barrow's goldeneye	*Bucephala islandica*
Biotoxic protozoa	*Toxoplasma gondii* *Cryptosporidium* *Giardia*
Black oystercatcher	*Haematopus bachmani*
Black scoter	*Melanitta perspicillata*
Blue mussel	*Mytilus edulis; M.californicus*
Bonaparte's gull	*Larus philadelphia*
Brandt's cormorant	*Phalacrocorax penicillatus*
Bull kelp	*Nereocystis luethkeana*
Bull trout	*Ssalvelinus confluentus*
California gull	*Larus californicus*
California sea lion	*Zalophus californianus*
Caspian tern	*Sterna caspia*
Chinook salmon	*Oncorhynchus tshawytscha*
Chum salmon	*Oncorhynchus keta*
Club tunicate	*Stela clava*
Coho salmon	*Oncorhynchus. kitsutch*
Common goldeneye	*Bucephala clangula*
Common loon	*Gavia immer*
Common merganser	*Mergus merganser*
Common murre	*Uria aalge*
Copper rockfish	*Sebastes caurinus*
Dall's porpoise	*Phocoenoides dalli*
Dinoflagellate	*Alexandrium catenella*
Dolly Varden trout	*Salvelinus malma malma*
Double-crested cormorant	*Phalacrocorax auritus*
Dungeness crab	*Cancer magister*
Eelgrass	*Zostera marina*
English sole	*Parophrys vetulus*
European green crab	*Carcinus maenas*
Geoduck	*Panopea abrupta*
Giant kelp	*Macrocystis integrifolia*
Glaucous-winged gull	*Larus glaucescens*
Gray whale	*Eschrichtius robustus*
Great blue heron	*Ardea herodias*
Greater Scaup	*Aythya marila*

Common Name	Scientific Name
Green sea urchin	*Stronglyocentrotus droebachiensis*
Harbor porpoise	*Phocoena phocoena*
Harbor seal	*Phoca vitulina*
Harlequin duck	*Histrionicus histrionicus*
Heermann's gull	*Heermanni philadelphia*
Herring gull	*Larus argentatus*
High arctic brant	*Branta bernicla*
Horned grebe	*Podiceps auritus*
Humpback whale	*Megaptera novaeangliae*
Knotweed	*Polygonum spp.*
Large burrowing Pacific clam	*Panopea abrupta*
Large dinoflagellate	*Noctiluca scintillans*
Lingcod	*Ophiodon elongatus*
Long-tailed duck	*Clangula hyemalis*
Mallard duck	*Anas platyrhychos*
Marbled murrelet	*Brachyramphus marmoratus*
Market squid	*Loligo opalescens*
Minke whale	*Balaenoptera acutoraostrata*
Non-native dwarf eelgrass	*Zostera japonica*
Non-native sea grass	*Spartina species*
Northern anchovy	*Engraulis mordax*
Northern pintail	*Anas acuta*
Nutria	*Myocastor coypus*
Olympia oyster	*Ostreola conchaphila*
Orca	*Orcinus orca*
Pacific cod	*Gadus macrocephalus*
Pacific hake	*Merluccius productus*
Pacific herring	*Clupea pallasi*
Pacific loon	*Gavia pacifica*
Paralytic shellfish poison (plankton)	*Alexandrium catenella*
Pelagic cormorant	*Phalacrocorax pelagicus*
Pigeon guillemot	*Cepphus columba*
Pink salmon	*Oncorhynchus. gorbuscha*
Pinto abalone	*Haliotis kamtschatkana*
Purple loosestrife	*Lythrum salicaria*
Purple sea urchin	*Stronglyocentrotus purpuratus*
Quillback rockfish	*Sebastes maliger*
Rainbow trout	*Oncorhynchus mykiss*
Red-necked grebe	*Podiceps grisegena*
Red sea cucumber	*Parastichopus californicus*
Red sea urchin	*Stronglyocentrotus franciscanus*
Red-throated loon	*Gavia stallata*
Rhinoceros auklet	*Cerorhinca monocerata*
Ruddy duck	*Oxyura jamaicensis*
Sea otter	*Enhydra lutris kenyoni*
Sixgill shark	*Hexanchus griseus*
Sockeye salmon	*Oncorhynchus. nerka*
Solitary tunicate	*Ciona savignyi*
Spiny dogfish	*Squalus acanthias*
Stalked kelp	*Pterygophora californica*
Steelhead	*Oncorhynchus mykiss*

Common Name	Scientific Name
Stellar sea lion	*Eumetopias jubatus*
Surf scoter	*Melanitta perspicillata*
Surf smelt	*Hypomesus pretiosus*
Thayer's gull	*Larus thayeri*
Vbrio (biotoxin)	*Vibrio parahaemolyticus*
Walleye	*Sander vitreus vitreus*
Walleye pollock	*Theragra chalcogramma*
Western grebe	*Aechmophorus occidentalis*
Western gull	*Larus occidentalis*
Western High Arctic black brant	*Branta bernicla*
White-winged scoter	*Melanitta fusca*
Zebra mussel	*Dreissena polymorpha*

Appendix C: Color figures

Chapter 3: Physical Environment and Habitat

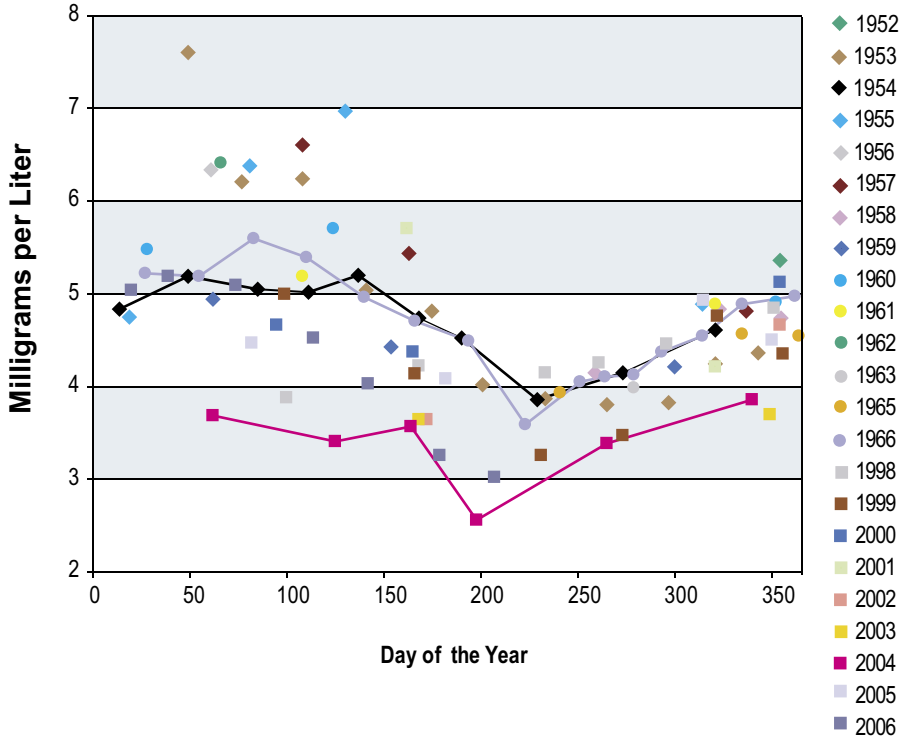


Figure 3-13. Average dissolved oxygen concentrations from Hood Canal. Waters deeper than 65 feet (20 m) from Dabob Bay to the Great Bend indicate that although oxygen typically reached hypoxia or even anoxia during summer throughout the recorded periods, more recently hypoxia is lasting longer and persisting throughout the entire year. This is likely to have serious consequences for marine organisms within Hood Canal that can survive short periods of low dissolved oxygen but may not survive prolonged periods of oxygen deprivation. (Source: University of Washington: Mark Warner, analysis; Collias and PRISM, data).

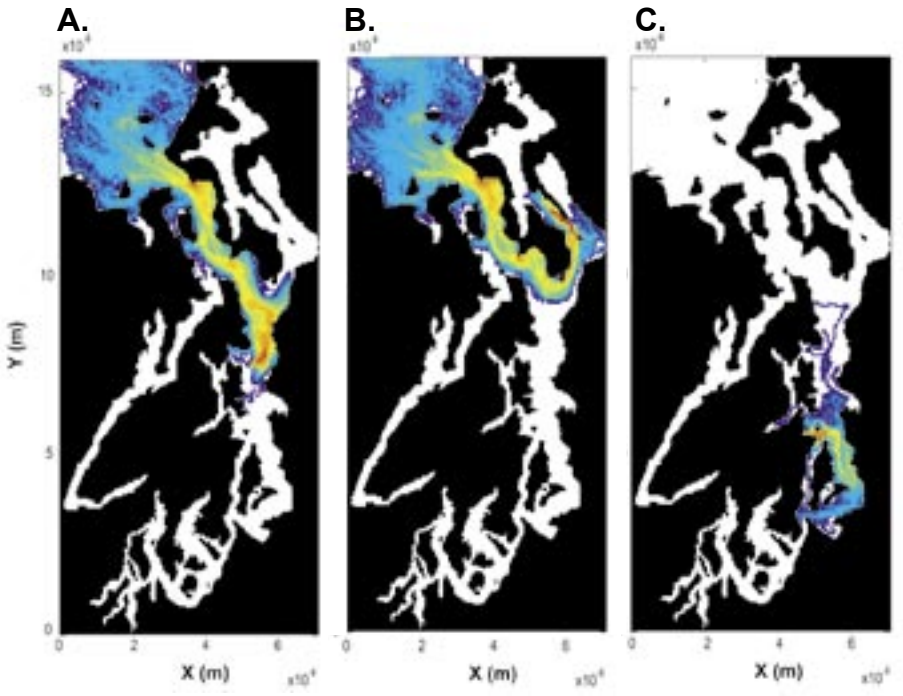


Figure 3-17. Track densities of particles released from a single point in the Puget Sound model. (A) Point Jefferson release, (B) Saratoga release, and (C) Alki Point release. The color bar indicates density of particle tracks in arbitrary units (it's scaled logarithmically—that is, a unit increase corresponds to a tenfold increase in track density). Particles are tracked over three weeks. The colored portion in each map shows the extent of the overall spread, and the warmest colors show the most popular paths. Over three weeks, water movement from a given point tends to flow primarily in the direction of the warmest colors. (Source: Kawase, UW)

Figure 3-18. A side view of track densities of particles in Admiralty Inlet released at the surface and tracked over a 24-hour period. Gray shading depicts the approximate center-channel bathymetry. The color bar indicates particle-track density in arbitrary units. Vertical mixing of the surface-released particles, can be seen downwards in the sill region, which is indicated by the solid line. (Source: Kawase, UW)

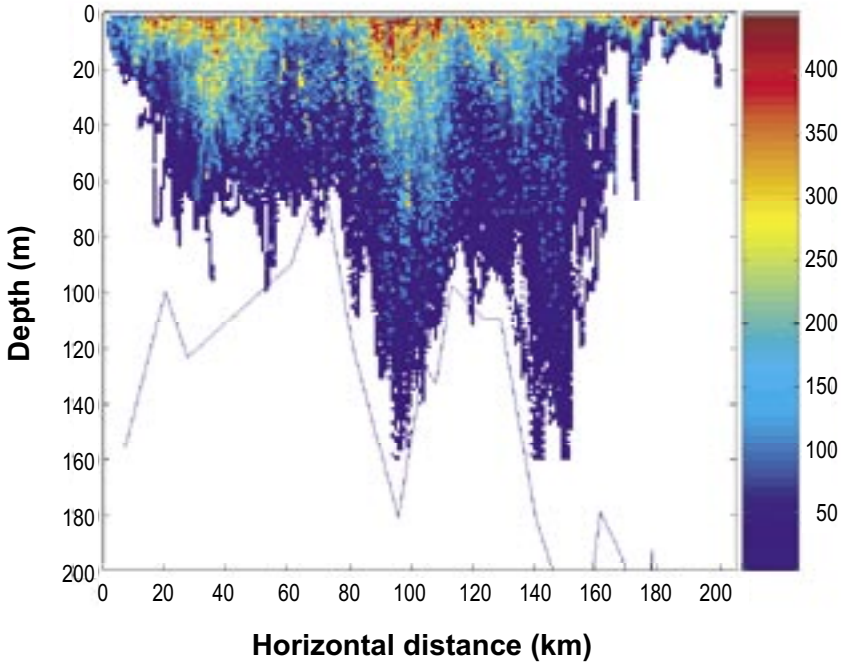
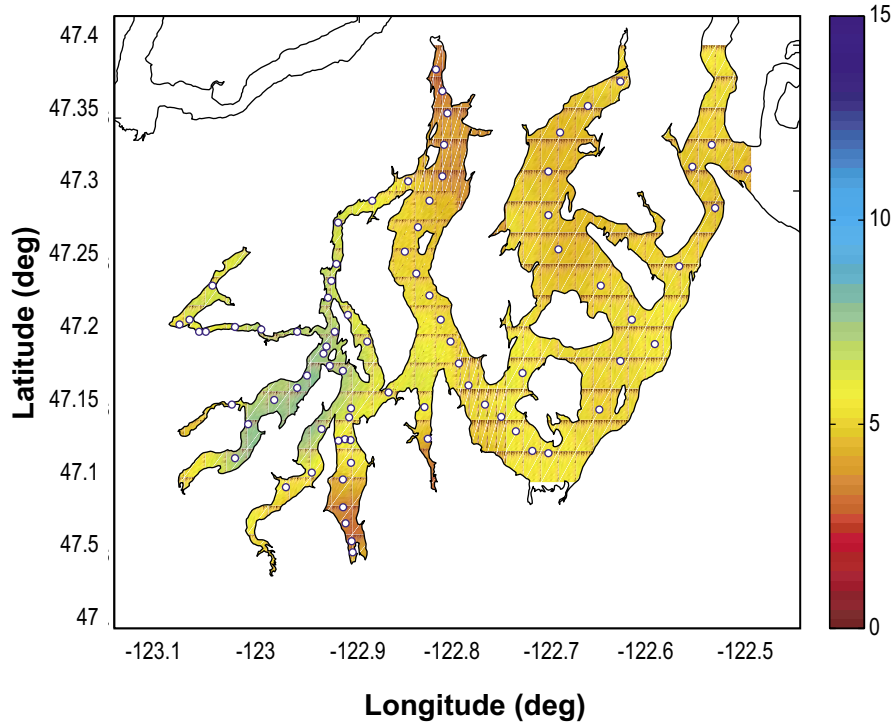


Figure 3-19. Distribution of DO in South Puget Sound during a fall 2003 sampling cruise. Case, Carr, Budd, and Henderson Inlets all had relatively low DO concentrations at that time. Darker areas generally correspond to the areas with moderate to high sensitivity to eutrophication, noted in Table 5-1 and Figure 5-6 (eutrophication index). (Source: Ecology)



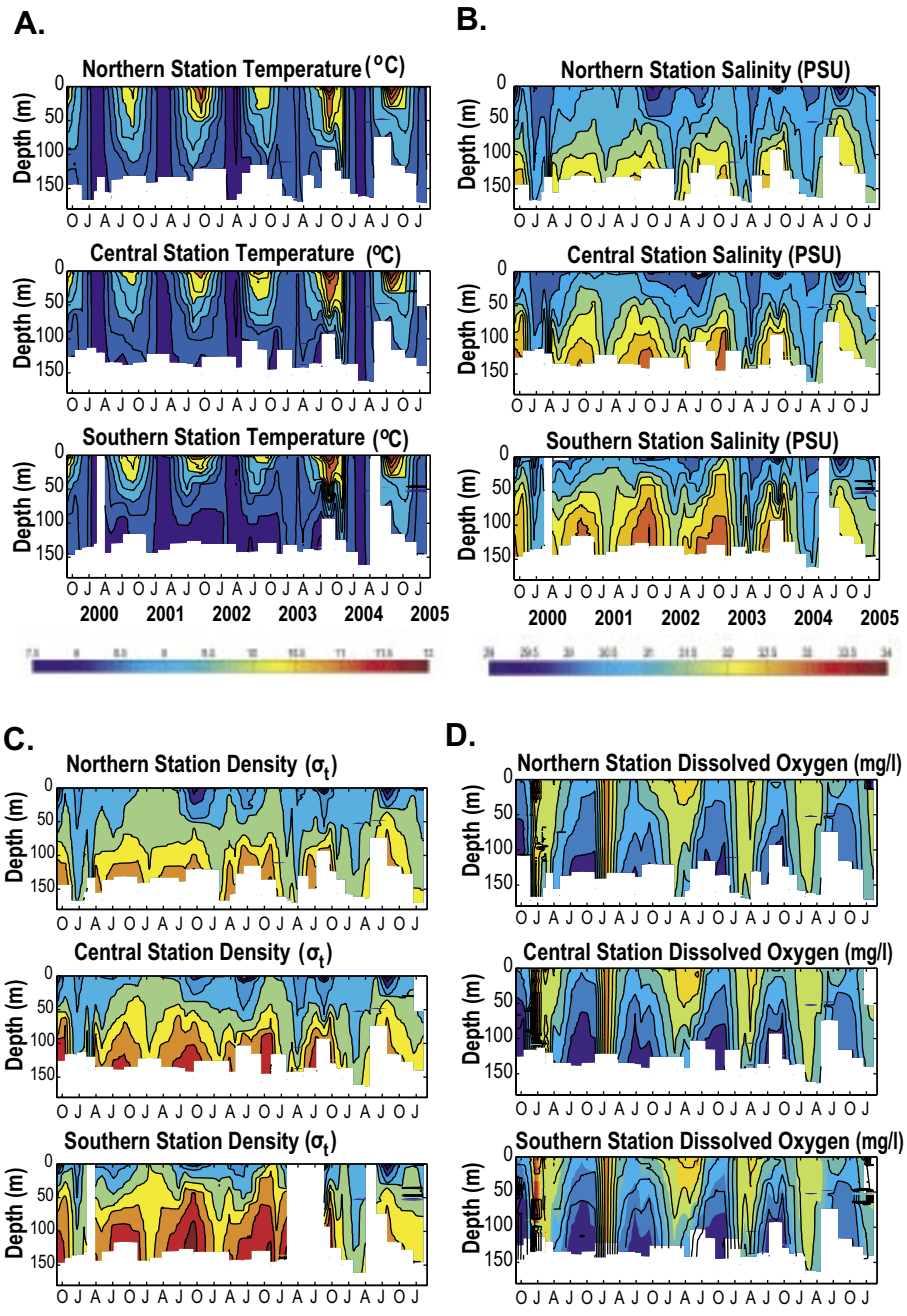


Figure 3-20: Joint Effort to Monitoring the Straits (JEMS). JEMS time-series data showing:

A. Temperature
B. Salinity
C. Density
D. Dissolved oxygen

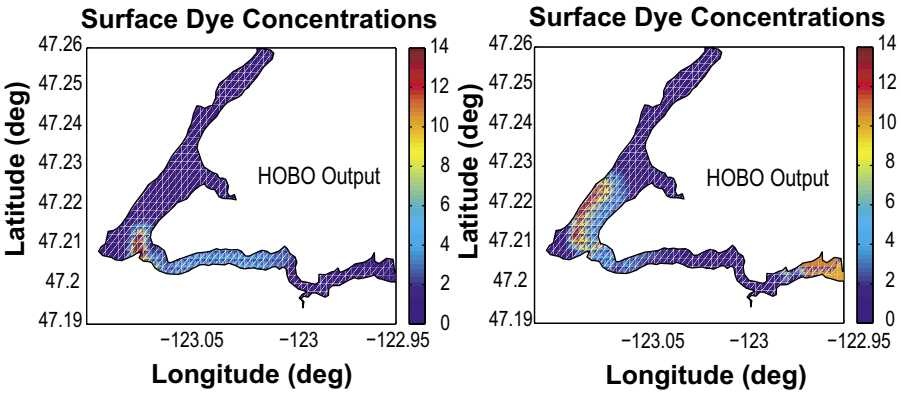
Data were collected at the three stations positioned across the Strait of Juan de Fuca, between San Juan Island and Port Angeles. Shown are contours of monthly data from September 1999 through December 2004.

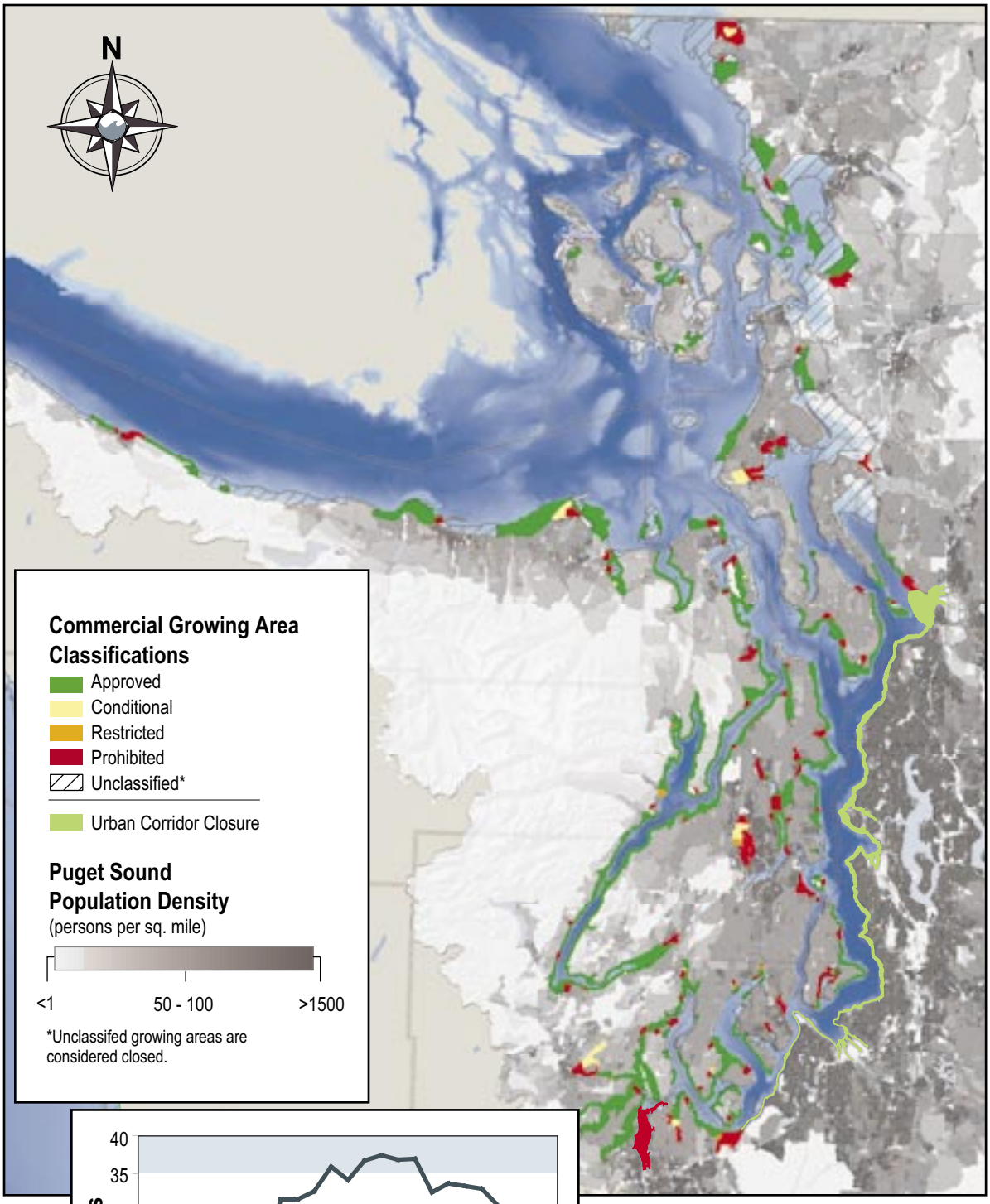
Aside from seasonal cycles, there is distinct inter-annual temperature variation, which mirrors the El Niño Southern Oscillation (ENSO)-driven climate pattern (colder 2000, 2001 and 2002, warmer 2003, 2004). Also, the higher salinity signal from the 2000-2001 drought is clearly seen in the record. Both temperature and salinity affect seawater density, which controls the degree of stratification or layering of water in Puget Sound. There is also considerable inter-annual variation in the oxygen record.
(Source: Ecology and UW)

Figure 3-26. Satellite image of the Strait of Georgia. This photo shows a sediment plume from the Fraser River and the location of PSAMP monitoring station, June 2003.
(Source: Ecology)

Chapter 5: Nutrients and Pathogens

Figure 5-18. Circulation in Hammersley Inlet, South Puget Sound. Model results showing the distribution of simulated effluent (dye) in Hammersley Inlet at one hour after slack low tide (left figure) and two hours after slack low tide (right). The results demonstrated the effects of discharge location on effluent dilution and indicated that extending the diffuser across Hammersley Inlet could reduce the concentration of effluent reaching the shellfish beds. Minimizing effluent during slack tides, when mixing with seawater is least effective, could also reduce the concentration of effluent.
(Source: Ecology)





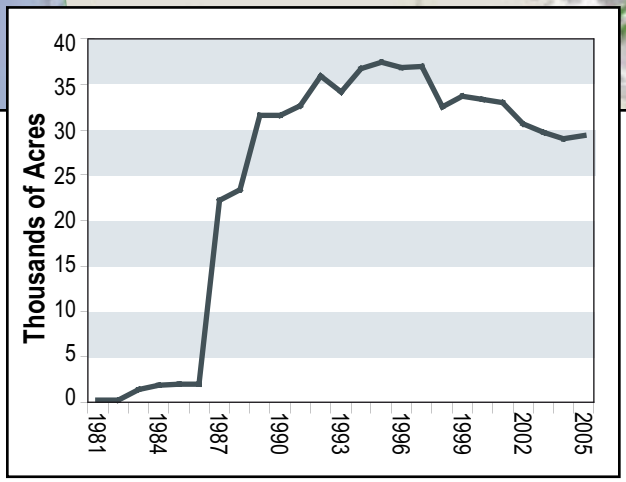


Figure 5-27. Population density and shellfish classification in Puget Sound and surrounding watersheds. Areas of Puget Sound with the lowest population densities tend to have the highest classified shellfish growing areas. (Source: PSAT)